

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN
COMPUTER SCIENCE**

COURSE CODE: MATH 110

COURSE TITLE: BASIC MATHEMATICS

STREAM: Y2S2

DAY: FRIDAY

TIME: 9.00 – 11.00 A.M.

DATE: 27/03/2009

INSTRUCTIONS:

Attempt **QUESTION ONE** and **ANY OTHER TWO** questions.

PLEASE TURN OVER

Question One (30mks)

(a) Consider the following logical equivalence summarized below and draw the truth table to extract the logical conclusion.

$$(p \rightarrow q) \wedge (q \rightarrow r) = (p \rightarrow r) \quad (6mks)$$

(b) Prove that $1 + \sqrt{2}$ is irrational (4mks)

(c) Draw the truth table of the following $\sim p \Rightarrow q$ (5mks)

(d) Use the Venn's diagram to illustrate
 (i) $(A \cap B)$ (2mks)

(ii) $(A \cup B)$ (2mks)

(e) Show that $\sin 3x = 3 \sin x - 4 \sin^3 x$ (6mks)

(f) Prove by induction that $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ (5mks)

Question Two (20mks)

(a) Using the truth tables, prove

(i) $(A \cap B) \cup (A \cap C) = A \cap (B \cup C)$ (4mks)

(ii) $(A \cup B) \cap (A \cup C) = A \cup (B \cap C)$ (4mks)

(b) prove by induction that

$$1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad (6mks)$$

(c) show that $\frac{d}{dx} \sin x = \cos x$ (4mks)

(d) What do you understand by closure by Addition and closure by multiplication? (2mks)

Question Three (20mks)

(a) The general geometrical progression is given by $a, ar, ar^2, \dots, ar^{n-1}$

Derive (i) the equation of getting the sum of G.p's (8mks)

(ii) the sum to infinity (2mks)

(b) Using the concept of infinite progressions express as fraction in the lowest form the following

(i) $0.4\bar{5}$ (3mks)

(ii) $0.\bar{3}$ (3mks)

(c) There are 4 boys and 3 girls at a party in how many ways can a team of 4 pupils be formed so as to include at least one girl? (4mks)

Question Four (20mks)

(a) With good illustrations prove

(i) Cosine Rule (7mks)

(ii) Sine Rule (7mks)

(b) Obtain a truth table using the Boolean logic of $\cdot (+) = \cdot + \cdot$ (6mks)

Question Five (20mks)

(a) Functions f and g are defined over domain of \mathfrak{R} as follows

$$f : \mathfrak{R} \rightarrow \frac{3x-2}{x}$$

$$g : (x) \rightarrow x^2 + 2x + 2$$

(i) $f \circ g$ (3mks)

(ii) $g \circ f$ (3mks)

(iii) $\{ f(x) \}$ (4mks)

(b) Use the binomial theorem to approximate the value of $(1.002)^{10}$ up to where x^2 (4mks)

(c) Show that $\sqrt{2}$ is irrational number (6mks)